

INFORMATION SHEET

ORDER NO. R5-2006-XXXX

THE BOEING COMPANY

INTERIM GROUNDWATER EXTRACTION AND TREATMENT SYSTEMS – EX-5 and GET H-B

INACTIVE RANCHO CORDOVA TEST SITE

SACRAMENTO COUNTY

Background

The Boeing Company (Boeing) operated a rocket-testing facility in eastern Sacramento County near Rancho Cordova and Folsom. The facility is on property known as the Inactive Rancho Cordova Test Site (IRCTS), and this property is currently owned by the Aerojet-General Corporation (Aerojet). Boeing, along with Aerojet, performed practices that have caused the release of pollutants into the vadose zone and groundwater at the IRCTS. The main pollutants of concern at the IRCTS are perchlorate, a component of solid rocket propellant, and volatile organic contaminants (VOCs) such as trichloroethylene (TCE) used in the cleaning of equipment.

A plume of perchlorate in groundwater has migrated from the IRCTS to the west underneath Mather Field. This plume of perchlorate creates or threatens to create a condition of pollution or nuisance. In response, the Board issued Cleanup and Abatement Order No. 97-093 to Boeing and Aerojet requiring the investigation of the extent of perchlorate in groundwater emanating from the IRCTS and the development of an interim remedial measure to contain the perchlorate plume.

To comply with the Cleanup and Abatement Order, Boeing and Aerojet submitted a plan proposing to extract groundwater from approximately five locations on Mather Field and pipe the water to a central treatment plant for treatment and discharge. Negotiations with Sacramento County, the current landowner where the extraction wells and treatment system are proposed, have been protracted. The delay in reaching agreement over a permanent treatment system has led to the development of a temporary treatment system using ion exchange to treat water from an extraction well at the head of the perchlorate plume, with discharge of the treated water to an on-site drainage system discharging to Morrison Creek. The temporary system commenced operation in May 2003 and will be utilized until the long-term treatment system is operational and piping can be constructed to connect EX-5 to the main plant, which is estimated to be within two years.

Interim Removal Action

The EX-5 interim groundwater treatment system consists of one extraction well extracting groundwater on the northwestern side of Mather Field. The treated groundwater is then discharged to a southward flowing drainage ditch which discharges to Morrison Creek. Morrison Creek is generally dry during the summer months along this stretch of the creek. Morrison Creek flows westerly across Sacramento County to Stone Lake. Flow from Stone Lake proceeds southward with eventual discharge to the Sacramento River.

Additional extraction wells may be added at a later date. The initial extraction rate has been as high as 800 gallons per minute (gpm) and could eventually expand up to 1500 gpm, but currently the system operates at approximately 450 gpm to capture the leading edge of the perchlorate plume near the extraction well. Groundwater treatment processes include a particulate filter, an ion-exchange unit, and

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discharge piping. The entire system was constructed on Mather Field under agreements with Sacramento County.

The ion exchange unit removes perchlorate to less than 4.0 micrograms per liter ($\mu\text{g/L}$), the practical quantitation limit, prior to recharge of the treated water. The Public Health Goal established by the California Office of Health Hazard Assessment, and current Department of Health Services Notification Level, for perchlorate is 6.0 $\mu\text{g/L}$.

Volatile organic contaminants, primarily TCE, are found in the same formation that will be extracted from for controlling the perchlorate plume. However, due to the large distance between the extraction well and the detectable concentrations of TCE, it is not anticipated that that VOCs will reach the extraction well on the western side of Mather Field during the limited operation of the interim treatment facility. In any case, the site of the EX-5 treatment plant has additional space to accommodate treatment components for the removal of VOCs, if needed. The permit calls for monitoring of VOCs and if verified concentrations are detected in the influent to the treatment system, Boeing is required to add appropriate treatment systems to remove the VOCs. The EX-5 treatment system will eventually be discontinued with the flow from extraction well EX-5 going to the new long-term treatment system described below.

Additions to the Treatment System

In order to provide capture of other portions of the perchlorate and TCE plume of groundwater pollution Boeing will be constructing the long-term treatment system on Mather Field. The GET H-B facility will be located in the Administration Area (north-central portion of Mather Field). Construction of a second interim plant, permitted in the previous adopted version of the permit, will no longer occur. The GET H-B system will initially be designed to treat up to 2000 gpm from extraction wells in the east and south-east portion of Mather Field. The system will be expanded over time to include additional wells, including EX-5, and have a capacity to treat 4000 gpm. The treatment plant will utilize the same treatment process as the EX-5 system, but will include a granular activated carbon treatment (GAC) system for removal of VOCs. GAC has been shown to effectively remove VOCs to less than 0.5 $\mu\text{g/L}$, below the Water Quality Objectives for the VOCs found in the groundwater contaminant plume. The discharge from the GET H-B treatment system is to a drainage ditch that discharges to the drainage ditch receiving the flow from the EX-5 system. The flows from the two systems combines and discharges to Morrison Creek on the southwest side of Mather Field.

Basin Plan, Beneficial Uses, and Regulatory Considerations

Surface water drainage from the treatment facility is to Morrison Creek, tributary to the Sacramento River. The *Water Quality Control Plan for the California Regional Water Quality Control Board Central Valley Region, Fourth Edition* (Basin Plan), designates beneficial uses, establishes water quality objectives, and contains implementation plans and policies for all waters of the Basin. Beneficial uses often determine the water quality objectives that apply to a water body. For example, waters designated as municipal and domestic supply must meet the maximum contaminant levels (MCLs) for drinking waters. The Basin Plan sets forth the applicable beneficial uses (industrial, agricultural, and domestic

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supply in this instance) of groundwater, procedure for application of water quality objectives, and the process for and factors to consider in allocating waste assimilation capacity.

Reasonable Potential and Anti-degradation Analyses

A reasonable potential analyses for priority pollutants, utilizing guidance covered by the Policy for the Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP), adopted in March 2000 by the State Board, was conducted based upon data submitted by Boeing regarding effluent concentrations of volatile organic compounds.

The numeric water quality criteria for priority pollutants were promulgated by U.S. EPA with the adoption of the *National Toxics Rule* (NTR) on 5 February 1993 and the *California Toxics Rule* (CTR) on 18 May 2000. The reasonable potential analysis for trichloroethene and perchlorate revealed that these constituents may exceed numeric water quality criteria, and require limits. Limits were not included for those detected constituents where there is no reasonable potential to exceed a standard.

Additionally, federal regulations require effluent limitations for all pollutants that are or may be discharged at a level that will cause or have a reasonable potential to cause, or contribute to an in-stream excursion above numerical or narrative water quality standard. The Discharger has provided information as to whether the levels of priority pollutants, including CTR and NTR constituents, and constituents for which drinking water maximum contaminant levels prescribed in the California Code of Regulations, in the discharge cause or contribute to an in stream excursion above a water quality objective. Perchlorate and TCE, discussed above, were the only pollutants that were determined to have a reasonable potential to cause or contribute to an in-stream excursion above a water quality objective.

Effluent Limits

The following water quality limits have been selected to implement all applicable water quality objectives for the protection of Board-designated beneficial uses of surface water in Morrison Creek and the Sacramento River downstream of the discharge point, and assumes that there is no dilution in Morrison Creek.

Perchlorate Limitation

The current Notification Level set by the Department of Health Services (DHS) -Office of Drinking Water as its recommended value not to be exceeded in a drinking water supply is 6 µg/l. The California Office of Environmental Health Hazard Assessment developed Public Health Goal for perchlorate of 6 µg/L. DHS is in the last stages of the process to establish a Primary Drinking Water Standard (MCL) for perchlorate. Ion-exchange treatment processes have been shown to be capable of cost-effectively reducing the perchlorate concentration to less than the practical quantitation level of 4 µg/L. The monthly average effluent limitation is established at 4 µg/l based on the ability to reduce the concentration to at or below the Public Health Goal, while allowing for up to 6 µg/L as a daily maximum.

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Volatile Organic Compounds

Currently, there are no detectable concentrations of VOCs in the portion of the perchlorate plume that will be captured by the EX-5 interim extraction and treatment system during its limited term of operation. However, a good distance upgradient of the EX-5 extraction well, concentrations of TCE are detected within the perchlorate plume. The new extraction wells that will be connected to the GET H-B treatment system will be extracting from portions of the plume that contain TCE. TCE has a Primary Drinking Water Standard of 5 µg/L and a Public Health Goal (PHG) of 0.8 µg/L. The effluent limit is set at 0.5 µg/L as conventional TCE removal systems have been shown to be capable to cost-effectively remove TCE to 0.5 µg/L. This is below the CTR value of 2.7 µg/L.

During initial startup of the treatment system, samples of the effluent contained low concentrations of trihalomethanes (i.e., chloroform 5 to 9.4 µg/L, bromodichloromethane 0.86 to 2.1 µg/L). The source of the trihalomethanes was the potable water that was used to slurry the ion exchange resin into the vessels. The influent to the treatment system had no detectable concentrations of the two trihalomethanes. The trihalomethanes disappeared after a short time of system operation. The permit allows for the discharge of trihalomethanes up to 10.0 µg/L for two weeks following ion exchange resin change-out. The effluent limit is below the Primary Drinking Water Standards and CTR values for the trihalomethanes.

Other

The original permit described analysis for metals in samples collected from the groundwater monitoring system and extraction wells and influent to the treatment system that were used to assess which metals may be of concern. That analysis found only two metals of concern that were detected, or could be of potential concern in Morrison Creek. Boeing completed a study of the two metals, copper and lead, and found that the effluent from the treatment plant contained much lower concentrations of copper and lead than initially anticipated. Based on that study, there is not a reasonable potential for copper or lead to exceed water quality objectives in Morrison Creek. The detected values of copper, lead, and hardness have been well below the effluent limitations established in the original permit of 11 µg/L for copper and 2.5 µg/L for lead.

The following tables provide the rationale for the effluent limits.

Table 1: Monthly Average Limit

Constituent	Monthly Average Limit	Units	Reference
Trichloroethene	0.5	µg/l	PHG, Best Practicable Treatment
Perchlorate	4	µg/l	DHS Action Level, Best Practicable Treatment

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Discharge limits are primarily based on the *Fourth Edition of the Water Quality Control Plan (Basin Plan) for the California Regional Water Quality Control Board - Central Valley Region, Sacramento River and San Joaquin River Basins*, and Best Available Technology for removal of VOCs and perchlorate.

Receiving Water Limitations

Receiving Water Limitations D.1 through D.13 are found in the Basin Plan and deal with general receiving water parameters. Given that the treated groundwater is not a discharge of elevated temperature wastewaters, limitations for temperature found in the *Water Quality Control Plan for Control of Temperatures in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California* are not included.

Chronic toxicity and acute toxicity testing of the effluent is required.

AMM (11/08/05)